

**REMARKS**

The Office Action dated October 16, 2008, has been received and carefully noted. The above amendments and the following remarks are submitted as a full and complete response thereto.

By the foregoing Amendment, claims 7 and 11 have been amended, and Claim 13 have been canceled, without prejudice or disclaimer. Clear support for these amendments can be found at the specification at, for example, page 7, lines 21-23. Therefore, no new matter has been introduced. After entry of this Amendment, Claims 7 and 11 are currently pending.

In the Office Action mailed October 16, 2008, Claims 7 and 11 were objected to for informalities. In response, Claims 7 and 11 have been amended to correct the informalities. Therefore, withdrawal of the above objection is respectfully submitted.

The specification was also objected to for informalities. Based on the assertions in the Office Action, the objection of the specification should be withdrawn after the objections to Claims 7 and 11 are overcome.

In the Office Action, Claim 7 was rejected under 35 U.S.C. §103(a) as being allegedly unpatentable by U.S. Patent No. 6,531,405 to Wegleiter ("Wegleiter"). Further, Claims 11 and 13 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Wegleiter in view of U.S. Patent No. 5,308,996 to Itabashi ("Itabashi"). It is noted that Claims 7 and 11 have been amended and Claim 13 has been canceled. To the extent that the rejections remain against the claims as pending, Applicants hereby traverse the rejections as follows.

Claim 7, as amended, recites that the fine projections are formed densely by wet-etching the pellet, and each of the fine projections has a diameter in a range of 0.3  $\mu\text{m}$  to less than 3  $\mu\text{m}$ , and the diameter is a length extending from a starting point of one of the fine projections to an ending point of the one of the fine projections, and wherein the convex surfaces of the rough surfaces are configured to allow a light getting to an interface between a light emitting surface and the air at an angle larger than a critical angle of total reflection  $\theta$  to be transited into the air through the convex surfaces.

Claim 11, as amended, recites a fabrication process for a light emitting diode comprising forming a pellet on a major front surface of the light emitting diode where an electrode is formed, wherein the major front surface is made of a GaAsP mixed crystal, wet-etching the pellet with an etching solution of an aqueous solution consisting of  $\text{Br}_2$ , nitric acid, hydrofluoric acid and acetic acid, or consisting of  $\text{I}_2$ , nitric acid, hydrofluoric acid, and acetic acid to form fine projections that are formed densely on the major front surface and all side surfaces of the pellet, wherein the fine projections have a diameter in a range of 0.3  $\mu\text{m}$  to less than 3  $\mu\text{m}$  and the diameter is a length extending from a starting point of one of the fine projections to an ending point of the one of the fine projections, wherein the etching solution contains 40 to 80 parts of nitric acid, 40 to 300 parts of hydrofluoric acid and 400 to 2000 parts of acetic acid based on 1 part of  $\text{Br}_2$  or  $\text{I}_2$  in a molar ratio.

Although the Office Action admitted that Wegleiter does not explicitly teach a specific range of the diameter which is defined as being a length from a starting point of one of the fine projection to the ending point of the one of the fine projection, as claimed in Claim 7, the

Office Action nevertheless alleged that the convex surfaces structure of Wegleiter has a general diameter length and accordingly, it would have been obvious to one of ordinary skill in the art to use the convex surfaces having a general diameter of Wegleiter in the range as claimed.

Applicants respectfully disagree. It is noted that the Declaration under 37 C.F.R. 1.132 submitted by Applicants on April 24, 2007, has clearly set forth the differences between Wegleiter and the claimed invention. Based on the Declaration, there are remarkable differences between the roughen surface of the present invention and that of Wegleiter. The roughened surface according to Wegleiter does not have the feature that the arc-shaped projections, i.e., the fine projections, on the air side are condensely gathered as that of the present invention (see photos cited in the Declaration). That is, by using Wegleiter's teaching, it would not achieve the fine projections with claimed features. Besides, because Wegleiter use only a HF solution, instead of a solution consisting of Br<sub>2</sub>, nitric acid, hydrofluoric acid and acetic acid, or consisting of I<sub>2</sub>, nitric acid, hydrofluoric acid, and acetic acid, as in the present invention, to etch the pellet, it would not be possible to achieve fine projections having a diameter in a range of 0.3 μm to less than 3 μm where the diameter is a length extending from a starting point of one of the fine projections to an ending point of the one of the fine projections, as recited in amended Claim 1 or amended Claim 11. Therefore, without experimentally trying different etching solutions, it would not have been obvious for one skilled in the art to use Wegleiter's teachings to achieve the light emitting diode with a structure recited in amended Claim 1 and the process of amended Claim 11.

Further, regarding Claim 11, the Office Action asserted that it would have been obvious for one skilled in the art at the time the invention was made to modify the aqueous etching solution of Wegleiter with the aqueous etching solution having  $I_2$ , nitric acid, acetic acid, and hydrofluoric acid as taught by Itabashi. However, Applicants submit that one skilled in the art would not be motivated to combine the method of Wegleiter and the aqueous etching solution of Itabashi because Itabashi merely discloses to use the aqueous etching solution having  $I_2$ , nitric acid, acetic acid, and hydrofluoric acid to selectively etch the  $n^+$  type a-Si:H layer of TFT device. There is no teachings in Itabashi that its aqueous etching solution can be used to make the roughened surface on the light emitting diode which is made of a GaAsP mixed crystal. On the other hand, the etching solution used in the present invention is to make the roughened surface on the light emitting diode which is made of a GaAsP mixed crystal. Indeed, Wegleiter and Itabashi are used in different technical fields. Therefore, the assertions in Office Action are merely impermissible hindsight, which should be avoided.

Further, the features of Claim 13, now canceled, have been incorporated into Claim 11, as amended. In the Office Action, regarding Claim 13, the Examiner alleged that although neither Wegleiter nor Itabashi specifies the concentration molar ratio ranges of the nitric acid, hydrofluoric acid, acetic acid, and  $I_2$  as claimed, it is common in the semiconductor art to vary the concentration molar ratio of the chemical compounds in the etching solution. Applicants respectfully submit that the concentration molar ratio range is critical in the manufacturing process to achieve fine projections in the width range of the claimed invention, depending on factors, such as the etching solution, the etching time, the

temperatures, etc., for manufacturing the light emitting diode. Therefore, the concentration molar ratio range cannot be arbitrarily changed under specified manufacture factors. Besides, as admitted in the Office Action, none of the cited references teaches or suggests that the etching solution contains 40 to 80 parts of nitric acid, 40 to 300 parts of hydrofluoric acid and 400 to 2000 parts of acetic acid based on 1 part of Br<sub>2</sub> or I<sub>2</sub> in a molar ratio, as recited in Claim 13, now combined into amended Claim 11, amended Claim 11 is allowable over the cited art.

Based on the above, amend Claim 7 is allowable over Wegleiter and also allowable over Wegleiter over Itabashi. For similar reasons, amended Claim 11 is allowable over Wegleiter in view of Itabashi.

### **Conclusion**

Applicants respectfully submit that this application is in condition for allowance and such action is earnestly solicited. If the Examiner believes that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below to schedule a personal or telephone interview to discuss any remaining issues.

In the event that this paper is not considered to be timely filed, an appropriate extension of time is requested. Any fees for such an extension, together with any

additional fees that may be due with respect to this paper, may be charged to counsel's  
Deposit Account Number 01-2300, referencing **Docket Number 107242-00005**.

Respectfully submitted,  
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